

Ch 5 Polynomials

5-1 Monomials

-Expression that is a number, variable, or a product of a number and one or more variables

-No variables in denominator, no variables with negative exponents, no variables under radicals

Examples of Monomials

$$3x^2 \quad 5 \quad x$$

Not Monomials

$$\frac{2}{x} \quad \sqrt{y} \quad x^{-3}$$

Properties of Powers

For a, b real numbers and m, n integers:

$$(a^m)^n = a^{mn}$$

$$(ab)^m = a^m b^m$$

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}, b \neq 0$$

$$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n \text{ or } \frac{b^n}{a^n}, a \neq 0, b \neq 0$$

$$a^0 = 1$$

$$5^2 \div 5^2 = 5^0 = 1$$

Exponent Laws/Rules/Properties

Negative Exponent

$$a^{-n} = \frac{1}{a^n} \text{ and } \frac{1}{a^{-n}} = a^n$$

Quotient of Powers

$$\frac{a^m}{a^n} = a^{m-n}$$

Product of Powers

$$a^m \cdot a^n = a^{m+n}$$

Degree-Sum of exponents of a monomial

(Variables Only)

Ex:

$$3x^2$$

$$\frac{1}{2}x^3$$

$$-5$$

$$-8z^5$$

Degree:

$$2$$

$$3$$

$$0$$

$$5$$

$$2x^1y^3$$

$$4$$

"Powers of 10"

<http://www.youtube.com/watch?v=BBsOeLcUARw>

works

<http://www.youtube.com/watch?v=0fKBhvDjuy0>

$$1 \cdot c^{12} \cdot c^{-4} \cdot c^6$$

$$c^{14}$$

$$2. \frac{b^8}{b^2}$$

b^6

$$3. (a^4)^5$$

a^{20}

$$4. \frac{x^{-2}y}{x^4y^{-1}}$$

$\frac{y^2}{x^6}$

$$5. \left(\frac{a^2b}{a^{-3}b^2} \right)^{-1}$$

$\left(\frac{a^5}{b} \right)^{-1}$

$= \frac{b}{a^5}$

$$6. \left(\frac{x^2y}{xy^3} \right)^2$$

$\frac{x^2}{y^4}$

$$12. \frac{2mn^2(3m^2n)^2}{12m^3n^4}$$

$\frac{2mn^2 \cdot 9m^4n^2}{12m^3n^4}$

$\frac{18m^5n^4}{12m^3n^4}$

$\frac{3m^2}{2}$

Scientific notation | A number expressed in the form $a \times 10^n$, where $1 \leq a < 10$ and n is an integer

1. 24,300
 2.43×10^4

2. 0.00099
 9.9×10^{-4}

4. 525,000,000
 5.25×10^8

5. 0.0000038
 3.8×10^{-6}

10. $(3.6 \times 10^4)(5 \times 10^3)$
 18×10^7
 1.8×10^8

13. $\frac{9.5 \times 10^7}{3.8 \times 10^{-2}}$
 2.5×10^9

16. $(3.2 \times 10^{-3})^2$
 10.24×10^{-6}
 1.024×10^{-5}

5-2

Polynomials

Polynomial | a monomial or a sum of monomials

1. $(6x^2 - 3x + 2) - (4x^2 + x - 3)$
 $2x^2 - 4x + 5$

3. $(-4m^2 - 6m) - (6m + 4m^2)$
 $-8m^2 - 12m$

5. $(18p^2 + 11pq - 6q^2) - (15p^2 - 3pq + 4q^2)$
 $3p^2 + 14pq - 10q^2$

ex: $a^3b^5c + 3x^4 - 9(1)$
 $\begin{matrix} 9 & 4 & 0 \\ \downarrow & & \\ \text{deg rec? } 9 \end{matrix}$

Multiplying Polynomials**FOIL Pattern**

To multiply two binomials, add the products of
F the *first* terms,
O the *outer* terms,
I the *inner* terms, and
L the *last* terms.

$(a+b)(c+d)$

3. $-5y^2(y^2 + 2y - 3)$

$$-5y^4 - 10y^3 + 15y^2$$

5. $(5 - 4x)(3 - 2x)$

$$15 - 10x - 12x + 8x^2$$

$$15 - 22x + 8x^2$$

6. $(2x - 1)(3x + 5)$

$$6x^2 + 7x - 5$$

13. $(3t^2 - 8)(t^2 + 5)$

14. $(2r + 7)^2$

$$(2r + 7)(2r + 7)$$

$$4r^2 + 28r + 49$$

$$\begin{bmatrix} (a+b)^2 \\ a^2 + 2ab + b^2 \end{bmatrix}$$

20. $(2n^2 - 3)(n^2 + 5n - 1)$

$$2n^4 + 10n^3 - 2n^2 - 3n^2 - 15n + 3$$

$$2n^4 + 10n^3 - 5n^2 - 15n + 3$$

$$21. (x - 1)(x^2 - 3x + 4)$$

Special Cases

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$(a - b)^2 = a^2 - 2ab + b^2$$

$$(a + b)(a - b) = a^2 - b^2$$

Homework

p. 226-227 19-35odd, 41-43, 47-52

p. 231-232 16-21, 24, 27, 32, 37, 41, 47, 50